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ABSTRACT

This paper proposes a theoretical approach to mediated communication in organizations. It is argued that the man/machine interface in mediated human communication is better dealt with when a comprehensive theoretical approach is used than when separate communication devices are tested as they appear in the market, such as video-teleconferencing. Propinquity, or proximity, is considered to be the system's trait which is essential for the continuation of the human communication system. In a structural functional analysis, six propositions, 15 derived corollaries, and two limits propositions are presented. The variables included in the propositions are: perceived propinquity, perceived bandwidth, perceived complexity of the information, perceived degree of mutual directionality of the channel, communication skills, perceived communication rules, perceived number of choices among channels, perceived conflict, and perceived turbulence in the environment. Evidence from past research is used to support the perspective presented. (Author)

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A THEORY OF ELECTRONIC PROPINQUITY:

MEDIATED COMMUNICATION IN ORGANIZATIONS

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A Theory of Electronic Propinquity:

Mediated Communication in Organizations

This paper attempts to propose a general theory of mediated communication. The perspective presented is called electronic propinquity given the increasing role of electronic mechanisms in organizational life in interposing human contact.

The principles of the theory proposed here should apply not only to electronically mediated communication, but to all symbolic human interaction conducted over a wide range of channels.

Specifically in organizational life, face to face contacts are increasingly being replaced by devices which radically change the patterns of human interaction so well established in the past. As Miller (1976) points out, "There is bound to be a decline in the satisfaction of certain individual needs, for much of our humanity is acquired by direct experiences with other persons and with our environments as a whole" (pp. 5, 6).

Teleconferencing, or mediated two-way conferences in or among organizations, makes us particularly aware of the changes that are going to take place in organizational communication. Teleconferencing, as a form of mediated communication, can be understood as "all electronic means that permit two or more groups of physically separated users to communicate with one another" (Gartrell and Mendenhall, 1975, p. 2). In several countries, numerous efforts are being conducted in order to evaluate the impact of this form of communication. "In Canada, various decentralized federal government departments and others in the process of decentralization have used or are planning teleconferencing systems . . . other organizations

within and outside government are studying its potential as a service to meet their needs" (Jull, McCaughern, Mendenhall, Storey, Tassie, and Zalatan, 1976, p. 2).

Thayer (1968), taking into consideration the possibility of modifying traditional organizational procedures, says that "the media of communication - the intersection of materials and devices, the 'hardware' of communication technology - have therefore amplified and extended the reaches of man's own equipment . . . it has been the combined impact of materials and devices which has altered our communicative existences, problems, and possibilities most strikingly" (p. 258).

As a direct derivation from the above, the most striking consequences of new mediating technologies are changes in proximity. Propinquity refers to this precisely: Nearness in place, and as a possible derivation, nearness in time.

Kant postulates space and time as the two basic categories that make human knowledge possible. We impose the dimensions of space and time on everything that is accessible to our senses so to make the categorization of objects of knowledge possible. Space and time are also, as a consequence, the most primitive conditions for perception.

In a related manner, space and time, as physical dimensions, determine not only the way in which we know, and what we know, but more fundamentally the possibility of knowing at all.

Space determines who and what we know due to sheer accessibility. Propinquity is the basic condition for our senses to capture features of our environment. Propinquity, then, constitutes a basic condition for interaction when the object of knowledge is a person. This interaction process usually takes the form of what we call communication.

That propinquity is a basic prerequisite for communication seems to be taken for granted for most of us. "Despite consistent and clear data, psychologists seem reluctant to make the arrangement of people a major independent variable. . . . 'We treat space somewhat as we treat sex, it is there but we don't talk about it'. . . . " (Sommer, 1967, p. 145).

In one way or another, we organize our lives in terms of our communication activities, and propinquity is one independent variable we manipulate.

If we want to be in constant contact with scholars, we get involved in a university. If we want to make an acquaintance with a person of the opposite sex, we propitiate the interaction by making ourselves available: we ask for permission to sit at the same table in a crowded cafeteria and then we ask for the time, or make an observation about the climate. If we get a response, a certain kind of response, the desired interaction is started.

If we want to organize, regardless of the goal or goals of the organization, we call a meeting, we establish a common place of work, and, again, we make ourselves available or propinquitous to be able to communicate about the means for achieving the goal or goals of our organization. Furthermore, as we organize, we try to arrange our offices or places of work close to the places of work of others with whom we must interact more often.

Presumably, by examining the layout of an organization, we should be able to infer the communication links and their strength in that organization. I say presumably because it is the case in numerous organizations that as they evolve, they tend to allocate spaces not so much in terms of their function, but in terms of their availability.

On the other hand, when spaces are allocated arbitrarily or according

to some third criterion, the relationships that emerge seem to be a function of propinquity (for full discussion see Miller and Steinberg, 1975; and Marlowe and Gergen, 1969). For example, it has been found that the probability of marriage between two persons increases as the distance between the places where they live decreases; that roommates make friends faster with one another in a dormitory, than with anyone else, etc.

Collins and Raven (1969) make a distinction between physical and functional propinquity. Functional propinquity is more relevant in this context than sheer physical nearness, it is presence across long distances. Functional propinquity can exist given the telephone, letters, telegrams, interactive radio or television. These media are what diminish the impact of physical separation.

As a matter of fact we observe that in organizations, communication takes place between people that need to communicate, with respect to a certain common goal, through the telephone, the intercom, or other media, and then they have approached the other person in a figurative manner. In every-day language we say: "contact so-and-so on the phone"; "get in touch with me tomorrow (on the phone)." In this sense, a là McLuhan, we have electronically extended our senses in order to "be there" in a communicative fashion. It is not surprising then to hear the telephone company advertise that "long distance is the next best thing to being there." It can in fact be argued that mail and telecommunications in general are precisely technological approaches to "being there" when one cannot be there.

Electronic propinquity refers then to electronic proximity, or electronic nearness, or electronic presence. Here it should be noted that electronic propinquity is not synonymous with communication although it may appear as such. One can have a "Wats Line," and a potential set of

relationships and still not communicate. Electronic propinquity allows for the possibility of communication but it isn't communication itself.

Propinquity is of course a variable: one can be more or less far or near somebody else. One can be close in voice, and far in image. One can be close in image and voice, and far in touch and smell (and taste if you will). Respectively these values of propinquity would correspond roughly and not exhaustively to, for example, the following media: the telephone and video-phone.

If propinquity is considered to be the organizational trait that accounts for part of the variance in satisfaction and task accomplishment, as well as in the organization or system subsistence, then it seems important to understand what the factors are that determine propinquity and what the interrelationships are among such factors. However, physical proximity is irrelevant in this discussion. It is proposed here that a phenomenological approach is indicated for dealing with propinquity. "Lewin argued that the phenomena to which the psychologist should direct his attention are what the individual subjectively perceives, not what the observer perceives as the 'objective reality'" (Shepherd, 1964, p. 24). This notion is similar to Weick's (1969) enactment process: "The human <u>creates</u> the environment to which the system then adapts. The human actor does not react to an environment, he enacts it. It is this enacted environment, and nothing else, that is worked upon by the processes of organizing" (p. 64). Kriste and Monge (1974) emphasize the importance of psychological distance:

> Whenever a significant boundary occurs, some form of interposed (non face-to-face) interaction must be utilized or communication cannot occur. Further, physical distance implies a continuous ratio level measurement, that is, twenty feet is twice the distance of ten feet and forty is twice twenty. The problem occurs when two people perceive the distance between themselves and the other as much different than is actually the case. (p. 3)

The question of measurement turns out to be, then, one of perceived propinquity: in comparison to . . . how close did you feel to . . . during the conference, for example. Under the same rationale, the postulated determinants of propinquity will also be conceptualized as phenomenological factors.

Perceived propinquity then is that communicative trait, in organizations or other settings, which should reflect a sense of involvement, mastery over the communication environment, and which within certain limits should provide communicative satisfaction, when the interaction is desired.

If the organization is conceptualized as a living system, then a structural-functional metatheoretic framework is called for. Perceived propinquity has been identified as playing a major role in determining the subsistence of the communication system, which is brought about by the satisfaction of the participants.

Monge (1972) in "The Study of Human Communication from Three Systems Paradigms" identifies the steps required by the logic of a structural functional analysis:

> (1) identification of the system, i.e., a set of interrelated parts (Merton calls them 'items') are identified which may be viewed as a whole. It is not necessary that all the parts be specified so long as (a) the system as a whole is identified, and (b) those parts which are necessary for the analysis are identified.
>
> (2) specification of the environment in which the system operates. This generally means the specification of all those factors that are not a part of the system but which may affect the particular behavior of the system being studied.
>
> (3) determination of some trait, attribute, or property of a system which is considered <u>essential</u> for the continuation of the system.
>
> (4) specification of the range, i.e., the different values, which the trait <u>may</u> assume as well as the range within which it <u>must</u> stay if the system is to remain in operation. (Every trait is assumed to be available even if only dichotomized into present-not present.)

> (5) a detailed account of how the parts (items, mechanisms, structures, etc.) collectively operate to keep the value of the trait within the limits required for the existence of the system despite other changes in the system or impinging influence from the environment. (pp. 61, 62)

Towards the formation of a theory of electronic propinquity, the steps of structural functionalism specified above will be taken, and then some of the literature accumulated will be reviewed and a rationale presented to support the propositions generated.

The system of reference is the human communication system in an organizational setting. The items necessary for the analysis are: a) perceived propinquity; b) the psychological bandwidth or perceived amount of information; c) the complexity of the information dealt with at a phenomenological level; d) the capacity of the channel for mutual directionality as perceived by the communicators; e) the communication skills available to the interactors; f) the perceived number of communication rules that the interactors have to conform to; and g) the perceived number of choices among channels that the communicators have.

The environment in which the system is assumed to operate is an enacted turbulent environment. Kelly (1974), in reviewing the work of Emery and Trist, refers to the turbulent environment as that which results in:

> . . . the difficulty of making predictions, which in turn compels management to proceed by satisficing rather than optimizing; to accept bounded rationality; to keep some of its options open . . . in the turbulent environment the dynamic processes arise from the field itself. Turbulence is characterized by complexity, which is largely generated by interactions of other organizations which may not directly interact with the organization most disturbed. (pp. 441-444)

If the environment of the organizational system is not perceived as operating in turbulent fields, the general motivation of communication producers and consumers may not be high enough as to try the implementation

of new communication devices. This specific environment may be crucial for the rest of the variables to operate in the ways to be specified. This environmental setting intrinsically assumes a healthy degree of conflict that needs to be managed.

The trait considered here as crucial for the continuation of the human communication system is perceived propinquity. This fundamental trait can conceivably fluctuate between some minimum and maximum values, to be empirically determined, of perceived conflict and turbulence in the environment. If no turbulences are perceived, the need to operate within new communication arrangements may disappear. If too much conflict is perceived in the interaction, the participants may simply prefer to withdraw from the communicative interaction, and use other means for achieving their goals.

An account of how the parts of the system operate properly constitute the body of the theoretical approach proposed here. The presentation will follow the format utilized by Hague (1965) and corresponds to Zetterberg's (1963) model for axiomatic theories. Six propositions, fifteen derived corollaries and two limits propositions are presented. A ceteris paribus constraint is supposed to operate for all. For all the variables included in the following propositions and corollaries it should be understood that they are phenomenological or perceived factors, but for ease of presentation the adjective perceived has been deleted. The one exception is with respect to communication skills, since it is not important how skillful an actor perceives him/herself to be, but the skills he/she has with respect to the community in which the interaction takes place.

Major Propositions

I. The wider the bandwidth the more propinquity.

II. The more complex the information, the less propinquity.

III. The more mutual directionality of the channel, the more propinquity.

IV. The more communication skills, the more propinquity.

V. The more communication rules, the less propinquity.

VI. The smaller the number of choices of channels, the more propinquity.

Derived Corollaries

1. The narrower the bandwidth, the more complex the information.
2. The wider the bandwidth, the more mutual directionality.
3. The more communication skills, the wider the bandwidth.
4. The more communication rules, the narrower the bandwidth.
5. The more choices of channels, the narrower the bandwidth,
6. The more complex the information, the less mutual directionality.
7. The more communication skills, the less complex the information.
8. The more communication rules, the more complex the information.
9. The less choices of channels, the less complex the information.
10. The more communication skills, the more mutual directionality.
11. The more communication rules, the less mutual directionality,
12. The less choices of channels, the more mutual directionality.
13. The more communication skills, the less communication rules.
14. The less choices of channels, the more communication skills.
15. The less choices of channels, the less communication rules.

Limits Propositions

VII. Conflict imposes the upper limit on the degree of propinquity that can be generated by the system of variables.

VIII. The turbulence of the environment imposes the lower limit on the degree of propinquity that can be generated by the system of variables.

It should be noted that the rule sign may not necessarily apply to the derived corollaries. The rule sign can be verbalized as: "the sign of the deduced relationship is the algebraic product of the signs of the postulated

relationships" (Costner and Leik, in Blalock, 1971, p. 51). "In general, without making further assumptions, the sign rule yields valid deductions if and only if $r^2_{AB} + r^2_{BC} > 1$. . . . Evidently, high relationships must be assumed if the sign rule is to be valid without further assumptions" (pp. 52-53). The validity of the corollaries is then contingent upon an empirical test of the propositions, provided that such test satisfies the conditions specified above.

The elements of a structural-functional analysis of perceived propinquity have been presented, and as a final step the theory of electronic propinquity has been delineated. Now, I turn to present available evidence and/or a rationale for each of the propositions.

I. The wider the bandwidth, the more propinquity. When one says that a telephone call is the "next best thing to being there," we imply that there is something missing. We also say, "I cannot explain the problem to you on the phone, let's get together tomorrow," implying that there is something that will be added by our physical presence. It seems to be, then, that complete propinquity exists when we are physically "there," or that we are in the position to maximize the transfer of information.

Bandwidth seems an appropriate name for this dimension, in the sense that the wider the band the larger the amount of information that one can receive or transfer. It follows then that the physical presence of a person represents a wider band than the case in which we have a telephone conversation.

The term bandwidth has been used in evaluating telecommunication devices by Ryan (1975), and Ryan and Craig (1975). Based on information theory, Ryan (1975) says:

> In that channel capacity is a function of channel bandwidth, it decreases as one moves from face-to-face to

> video-to-audio conferencing. Face-to-face communication provides wide channel bandwidth in which messages can be transmitted and received by any of the five senses while audio communication provides a narrow channel bandwidth in which messages can be transmitted and received by one sense only. Consequently, the entropy of a message sent over audio would be higher than the entropy of the same message sent by means of face-to-face communication. Moreover, the reliability of the audio message should be lower. (p. 2)

Stahmer and Havron (1973) further explicate the concept of bandwidth:

> The term channel capacity as commonly used refers to the power, bandwidth or amount of signals that a given channel can handle. The implication is that signals are sent by an electronic channel although the term could be applied to non-electronic means of transmitting information. . . . It would also include the ability of conferees to generate signals within a terminal and the implied ability on the part of receivers in that terminal to perceive them as cues. (p. 20)

Although channel capacity or bandwidth is an engineering term, amenable to "objective" measurement, it is meaningless in an objective form for the prediction of psychological phenomena. Consequently, we can turn to perceived bandwidth as the variable under consideration.

A social science truism is that our past experiences determine the way we perceive things. Our evaluation of propinquity will depend not so much on how close we are to another person in meters, but on the perception of closeness according to our past experiences, and on the bandwidth, or channel capacity, that we consider sufficient and necessary for the purpose of the interaction (for a discussion on proxemics see Hall, 1959).

Considering that the perception of propinquity should be closely related to attitudes towards the medium, Ryan and Craig (1975) have found some preliminary evidence for the proposition that bandwidth should be related to perceived propinquity. They found that attitudes toward the medium, attitudes toward the discussion, and the participants' mood were directly related

to channel capacity. Attitudes and mood were more positive towards face-to-face, and face-to-face teleconferencing than towards audio teleconferencing. Video and face-to-face conferencing were not found to differ significantly from each other.

Ryan and Craig did not measure subjective bandwidth and it could plausibly be anticipated that a perceptual measurement would render more definitive evidence with respect to media discrimination in terms of bandwidth.

In an organizational setting, where interpersonal contacts are increasingly becoming depersonalized (Miller, 1976), the prediction of subjective closeness in terms of channel capacity may enhance our ability to select communication media.

With respect to the degree of propinquity that we consider necessary and/or sufficient for the purpose of the interaction, we can recall instances in which we say: "It wasn't necessary for you to come in person, you could've told me that on the phone." At this point we turn to look at another dimension, that is, complexity of the information to be transmitted.

II. The more complex the information, the less propinquity. Complexity conceptualized as "a discrepancy between parts of the present perceptual or experiential field" (Berlyne, 1969, p. 839) has been found to result in tension. This stress can be functional as a stimulating device, but dysfunctional when an overload occurs.

Victor Vroom (1969) summarizes evidence to support the hypothesis that decentralized communication networks more efficiently deal with complex information or problems. A decentralized network is one where less structure and more interpersonal contact occurs among the members of a group. Complex information, then, seems to require more psychological propinquity for

effective problem solving, which in turn should lead to communicative satisfaction.

Perceived propinquity will then be said to be a function of the complexity of the information to be transmitted: "You're close enough for what you want to say." The more complex the information to be transmitted, the more senses that will have to get involved. We may want to show a chart, a picture (it is said that "a picture is worth more than a thousand words"), we may want to show our discontent or affection with a facial expression.

The complexity of the information, however, should be approached phenomenologically also. It should be more important to know how complex a person perceives a message to be, than to have a rating of internal consistency or number of elements in a message.

III. The more mutual directionality of the channel, the more propinquity. Sometimes we may find ourselves saying: "We are here together and it seems as if we are far apart." This statement suggests that being together requires feedback for perceived propinquity to exist.

Across different media, the degree to which feedback can be perceived to be more or less complete should vary. In a telephone conversation we don't have a large number of nonverbal cues in order to evaluate our performance in terms of the reactions of the receiver of our communications.

The Communication Studies Group (1971) points out the following:

> A free-flowing, spontaneous discussion between two or more people involves intricate coordination and 'meshing' of each individual's speech into one conversation. . . . Recent film analyses of conversations have provided striking evidence of the almost ballet-like inter-weaving of looks, gestures and body movements, as successive speakers take the floor, pause, are interrupted and resume talking. It follows that if the visual channel is removed, and the discussants can no longer see each other, this synchronization should be impaired. (p. 8)

They further state, according to their literature review:

> Previous work in this area suggests that even with a relatively simple task, there may be differences in communications efficiency between face-to-face and telephone. When . . . progressively reduced visibility in a dyad they found that with no vision there were longer pauses and more interruptions . . . with no vision there were more questions, and requests to repeat . . . speech was more formal (in that it resembled written communication), when subjects could not see each other. (p. 31)

The degree to which people perceive a channel to provide varying amounts of feedback is what here is called mutual directionality. The extent to which we feel close to the others should be a function of the resemblance of the mediated interaction to the traditional interpersonal encounter. Interpersonal perceived propinquity should then be directly related to mutual directionality: "If you don't talk to me it is like you weren't here."

IV. The more communication skills, the more propinquity. A certain degree of propinquity may be considered to be sufficient and necessary according to the communication skills of the interactors. If a person has mastered the skill of probing, or of redundancy, for example, for making up for the narrow bandwidth of a channel, the person may consider a certain degree of propinquity to be enough for the purposes of the interaction. The more a person has mastered communication skills appropriate to a certain medium, the more the person will be likely to say that that medium provides an acceptable degree of propinquity for an interaction.

Billowes (1972) says, "these experiments are performed on people with little or no experience of teleconference systems beyond the exposure received during the experiment . . . I expect that teleconference systems are unlike any present method of meeting and that it will take some time for regular users to learn how to operate effectively in this new medium" (p. 4).

It may even be argued that audio teleconferencing, or other interaction media such as mail, can be found to be negatively evaluated given a lack of media literacy which is needed for the effective use of a medium.

The dimension of communication skills can vary in a culture from very unsophisticated skills to a large repertoire of communication behaviors. The less communication skills, the more the need for, for example, a wide bandwidth for a certain level of propinquity to be considered acceptable. Other things being equal, the less communication skills, the less perceived propinquity. It is to be noted here that the assumption is made that the larger the communication skills repertoire of an individual, the more the individual will be likely to select from the pool of skills appropriate to the medium.

Communication skills as a factor that determines perceived propinquity, is the only one which does not seem amenable to a phenomenological approach. The measurement of communication skills requires a normative criterion to which the skills of an individual can be compared. In all other instances the individual is required to judge external attributes. Communication skills are a personal attribute which, when evaluated by the communicator him/herself, may be impaired by interference of factors such as self-esteem.

V. The more communication rules, the less propinquity. When the protocol of communication requires the compliance to certain rules, the necessary skills may not be exercised. Let's take, for example, the case in which a subordinate talks on the phone to a high-ranking executive in a corporation. The subordinate may not be able to repeat the same information several times without having the executive feel that he is being treated as stupid. This instance can be considered as a case of disparate communication skills, in which one of the members of the interaction is aware of the

necessity for redundancy and the other is not.

The members of the communication encounter may have equivalent communicative skills and still, following enduring patterns of behavior, fail to perceive that they are propinquitous enough to each other. This may be due to the fact that the breaking of the communication rules brings about sanctions that have been more or less specified (for a discussion of communication rules in organizations see Farace, Russell and Monge, 1974).

There is evidence which suggests that physical propinquity exerts strong influence on communication activities until a social structure emerges (Abrahamson, 1966).

Bailey, Sistrunk and Nordie (1963), in considering possible effects of teleconferencing in international settings, anticipate a formalizing effect on the interaction process through the need for standard procedures. It is possible to anticipate that the more cue restrictions of the medium the more rules emerge, and the less propinquity is perceived.

It can then be said that the more structured a situation, or the more communication rules, the less perceived propinquity, other things being equal. Weick (1969) implies that the more rules, the less uncertainty is removed from the information received. Consequently, the less uncertainty is removed from the information received, the less the pattern distinguished by the perceiver, and the less perceived propinquity.

VI. The smaller the number of choices of channels, the more propinquity. In our every-day communicative behavior, we find that there are situations in which we have more freedom of choice to interact or just be near, than in other situations. Communication rules may impose restrictions on the type of media that we can use in order to interact. Sheer availability of communication media impose restrictions as to which medium will be considered

satisfactory in terms of perceived propinquity.

Given a large number of choices we may say that the medium chosen for communication is that which highly rehearsed patterns of behavior have predetermined. Also, the medium to be chosen can be that which requires the least effort as perceived by the individual (Zipf's law, see Cherry, 1957). The channels that would require least effort can be anticipated to be those of wide bandwidth, high mutual directionality, and specially so when the information to be transmitted is perceived to be highly complex. Other things being equal, we would expect that the larger the number of choices the more perceived propinquity will be judged to be required.

When the only means of propinquity that we have is a telephone wire, for example (with its complementary apparatus), and we need to make our presence evident, we use and we consider it satisfactory since it is the only means we have. However, having a wide range of choices, among them physical propinquity, other things being equal, we would prefer it.

VII. Conflict imposes the upper limit on the degree of propinquity that can be generated by the system of variables. There is certain degree of conflict which makes the system of variables specified above inoperant. Modern organizational settings allow for a "healthy" degree of conflict which is resolved through communication in various forms (see Kelly, 1974). However, there should be a point up to which perceived propinquity creates dissatisfaction with the communication encounter, when the degree of perceived conflict in the interaction makes propinquity an aversive factor. This upper limit should be empirically determined.

VIII. The turbulence of the environment imposes the lower limit on the degree of propinquity that can be generated by the system of variables. There should be a minimal amount of turbulences perceived in the environment

by the members of the organization for the system of variables to operate as specified. The willingness on the part of the members of the organization to cope with a certain degree of conflict and to try to resolve it should be related to how important the organization feels it is to adapt to ever-changing situations. Similarly, the desire to understand complex problems, to use wide-band channels, to improve communication skills, etc., and to be psychologically close to others, should take place under conditions of a minimal amount of turbulence in the environment. This lower limit is to be empirically determined also.

A theoretical effort has been made to provide a framework for the evaluation of communication media. The present approach has been called "a theory of electronic propinquity" not because it only refers to propinquity by the electronic media, but because it emphasizes the salience of those media. The utility of this theory is that it specifies a set of variables and the relationships among those variables, and it provides for the falsification of the theory so that revisions can be made. The evaluation of separate devices as they appear in the market may not prove to be as functional as the evaluation of an overriding mechanism that is common to all devices invented and to be put out. A large set of studies have been conducted for comparing media of teleconferencing with no unifying criteria. This approach may then fill the gap. The reader is referred to Ryan and Mendenhall (1975), and to Korzenny (1975), for a summary of findings in the evaluation of teleconferencing devices in organizations such as businesses and government, and to Park (1974), and to Chan and Messick (1975) for summaries of findings with respect to telecommunications of various sorts in the field of medicine: medical education and health care.

The evaluation of communication devices in organizations in a systems

theoretical framework may enable us to buffer the psychological impact of technological change:

> As people construct communication barriers which isolate them from others--or, alternatively, as society imposes such barriers upon them--a heightened sense of alienation results, and the individual feels increasingly divorced from human contact. (Miller, 1976, pp. 3-4)

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